OSR 19-255 (Rev 9-6-2007)

Technical Task Request

Proc. Ref. E7, 2.02

Funding Source	Modification Traveler No.	Technical Task Request No.	Revision
SLA-SRNL-0037	N/A	HLE-TTR-2009-120	1
Design Authority Engineer: G.D. Thaxton GDT			Date: 1/13/2010
Performing Organization: Savannah River National Laboratory	Design Authority Manager* (Signature): W.L. Isom WLIsom		Date: 1/13/2010
Task Description: Tank 18 and 19 Additional Closure Sample Analysis			Due Date: 9/30/2010

Task Activity

☐ All activities are to be performed and documented in accordance with Manual E7.
Specific procedures are referenced with the associated tasks.
☒ Task Specific QA Plan, Reference To be developed by SRNL

Definition of Scope

☐ Not applicable to this request.
☒ Provided, Reference Provided in this TTR
☐ To be developed as part of this request. Specific activities are:

- ☐ Scoping Studies
- ☐ Feasibility Studies
- ☐ Technology Assessment
- ☐ Technology Development
- ☐ Inputs and Assumptions
- ☐ Other, Specify _____

Functional Requirements and Basis

☒ Not applicable to this request.
☐ Provided, Reference _____
☐ To be developed as part of this request. Specific activities are:

- ☐ Develop functional performance requirements to be included as part of the MT or Task Requirements and Criteria.

Facility Hazard Category

☐ Nuclear 2 ☒ Radiological ☐ Chemical (Low) ☐ To be developed as part of this request (Manual 11Q)
☐ Nuclear 3 ☐ Chemical (High) ☐ Other Industrial

Functional Design Criteria

☒ Not applicable to this request.
☐ Provided, Reference _____
☐ To be developed as part of this request. Specific activities are:

- ☐ Alternative Studies
- ☐ Develop functional design criteria to be included as part of the MT or Task Requirements and Criteria.

Functional Classification

☐ Safety Class ☐ Production Support ☐ To be developed as part of this request.
☐ Safety Significant ☒ General Service

Criteria Technical Review

☒ Not applicable to this request. ☐ To be performed as part of this request.

Design and Analysis/Technical Baseline Development

☒ Not applicable to this request.
☐ Provided, Reference _____
☐ To be developed as part of this request. Specific activities are:

- ☐ Calculations ☐ FDD ☐ Functional Acceptance Criteria
- ☐ Drawings ☐ SDD ☐ Technical Specifications
- ☐ Specifications ☐ CHAP ☐ Other, Specify _____
- ☐ DSA ☐ Quality Inpsection Plans

* Design Authority Manager's signature required if request is not associated with an MT.

Technical Task Request (Continued)

Proc. Ref. E7, 2.02

Design and Analysis/Technical Baseline Document Technical Review

☒ Not applicable to this request. ☐ To be performed as part of this request.

HLE-TTR-2009-120

Acceptance Testing

☒ Acceptance Testing is Not Part of this Request

☐ Test Procedure Provided, Reference _____

☐ Test Procedures to be Developed as Part of this Request

☐ Test Results Provided, Reference _____

☐ Test Results Evaluation Not Part of this Request

☐ Test Acceptance Report to be Provided as Part of this Request

Other Tasks or Clarification

The Savannah River National Laboratory (SRNL) is to provide sample characterization for additional Tank 18 and 19 floor samples. Each sample is to be analyzed for the target analyte list provided in Tables 1 through 4 (see continuation pages). SRNL is to analyze each sample in triplicate for analytes listed in Tables 1, 2, and 4. It is recognized that the analytes listed in Table 2 have target detection limits that are challenging. New or modified analytical methods and/or additional sample material will be required to approach these target detection limit values. Special emphasis should be placed on achieving these target detection limits for at least one sample location. Extra care should be taken to ensure the detection limits are reached for those constituents designated with an asterisk (*) and shown in bold type. These constituents are significant for the PA analyses.

The target detection limits for analytes listed in Table 3 are also expected to be a challange. Only one replicate per sample is required for these anlaytes. For a given analyte, if all sample analysis results are below detection limits, then only the lowest detection level obtained must be reported. (Continued on page 3)

Closure and Waste Determination Group Concurrence: B_A M 1/28/10

B.A. Martin

Other Reviews/Reports Required?

☒ No ☐ Yes, Specify _____

Technical Agency	Name (Print)
SRNL	F.M. Pennebaker

Acceptance of Task (Signature of Technical Agency Manager) — Date: 1/28/10

Closure/Deliverables Provided

Design Authority Engineer — Date

Design Authority Manager* — Date

HLE-TTR-2009-120

* Design Authority Manager's signature required if request is not associated with an MT.

Continued from page 2;

Table 1: Radiological Constituents

Constituents	Target	Unit
H-3	5.0E-2	µCi/g
C-14*	5.0E-3	µCi/g
Ni-59	9.0E-3	µCi/g
Ni-63	1.0E-2	µCi/g
Co-60	1.0E-4	µCi/g
Se-79	1.0E-4	µCi/g
Sr-90	1.0E-4	µCi/g
Y-90	1.0E-4	µCi/g
Tc-99*	1.0E-4	µCi/g
Sb-126	1.0E-4	µCi/g
Sb-126m	1.0E-4	µCi/g
Sn-126	1.0E-4	µCi/g
Cs-135*	5.0E-3	µCi/g
Cs-137	1.0E-4	µCi/g
Ba-137m	1.0E-4	µCi/g
Sm-151	8.0E-2	µCi/g
Eu-152	7.0E-4	µCi/g
Eu-154	1.0E-4	µCi/g
Th-229*	8.0E-5	µCi/g
Th-230*	1.0E-4	µCi/g
U-232	1.0E-4	µCi/g
U-233*	1.0E-4	µCi/g
U-234*	1.0E-4	µCi/g
U-235*	2.0E-5	µCi/g
U-236	1.0E-4	µCi/g
U-238	1.0E-4	µCi/g
Np-237*	1.0E-4	µCi/g
Pu-238*	1.0E-4	µCi/g
Pu-239*	1.0E-4	µCi/g
Pu-240*	1.0E-4	µCi/g
Pu-241	1.0E-4	µCi/g
Pu-242	1.0E-4	µCi/g
Pu-244	5.0E-5	µCi/g
Am-241*	1.0E-4	µCi/g
Am-242m	1.0E-4	µCi/g
Am-243*	1.0E-4	µCi/g
Cm-243	2.0E-3	µCi/g
Cm-244*	1.0E-4	µCi/g
Cm-245	2.0E-3	µCi/g
Cm-247	5.0E-5	µCi/g
Cm-248	5.0E-5	µCi/g
Cf-249	5.0E-4	µCi/g

* Extra care should be taken to ensure the detection limits are reached for those constituents designated with an asterisk (*) and shown in bold type. These constituents are significant for the PA analyses.

Table 2: Additional Radiological Constituents

Al-26	5.0E-5	µCi/g
Zr-93	5.0E-5	µCi/g
Nb-94	5.0E-5	µCi/g
I-129*	5.0E-5	µCi/g
Ra-226*	1.0E-4	µCi/g
Ac-227	5.0E-5	µCi/g
Pa-231*	5.0E-5	µCi/g

* Extra care should be taken to ensure the detection limits are reached for those constituents designated with an asterisk (*) and shown in bold type. These constituents are significant for the PA analyses.

Table 3: Additional Radiological Constituents

Cl-36	5.0E-5	µCi/g
K-40	5.0E-5	µCi/g
Pd-107	5.0E-5	µCi/g
Pt-193	5.0E-5	µCi/g

Table 4: Elemental and Chemical Constituents

Constituent	Constituent
Ag	Mn
As	Ni
Ba	Pb
Cd	Sb
Cr	Se
Cu	U
F	Zn
Fe	Nitrate
Hg	Nitrite

Approximately 70 grams of sample solids (to be provided by Savannah River Remediation (SRR)) are required per sample location to perform the requested analyses. Samples are to be gravimetrically composited (i.e., weighed prior to combining) into a single sample for each sample location. Samples are to be dried as necessary to complete required analyses. There is expected to be insignificant amounts of filtrate in the samples. Therefore, analysis of the filtrate is not required. Also, perform statistical analysis of the completed sampling analysis to determine the resulting sampling uncertainty. SRR will use this information to determine if additional sampling and/or sampling analysis is required to support tank closure.

DISCUSSION

Sampling and characterization of residual material in Tanks 18 and 19 have been previously performed as described in the approved sampling plan [1] and Technical Task Request [2]. However, additional sampling and analysis is required to reduce sampling uncertainty as described in SRNL reports [3, 4].

SRNL is to perform sample analysis on five (5) new floor samples for Tank 18 and six (6) new floor samples for Tank 19. Approximate locations for the new samples are shown in Figure 1 for Tank 18 (new samples for analysis are samples 1 through 5) and in Figure 2 for Tank 19 (new samples for analysis are samples 1 through 6).

Samples No. 6 and 7 for Tank 18 and samples No. 7 and 8 for Tank 19 are to be archived for possible future use. A floor scrape sample has been previously obtained at the Northeast riser of Tank 18. A partial suite of analyses has been completed for this sample. SRNL is to perform the characterization for any element, compound, or radionuclide required to complete the full suite of analyses for this sample. An additional sample (Sample No. 8 for Tank 18) of approximately 40 grams of solids will be obtained by SRR to ensure that there is adequate sample material for this location to complete all required analyses. This sample will only be characterized for those analytes needed to complete the full suite of analyses for this sample location. Otherwise, this sample is to be archived for possible future use.

Please note that all detection limits specified are for a wet slurry.

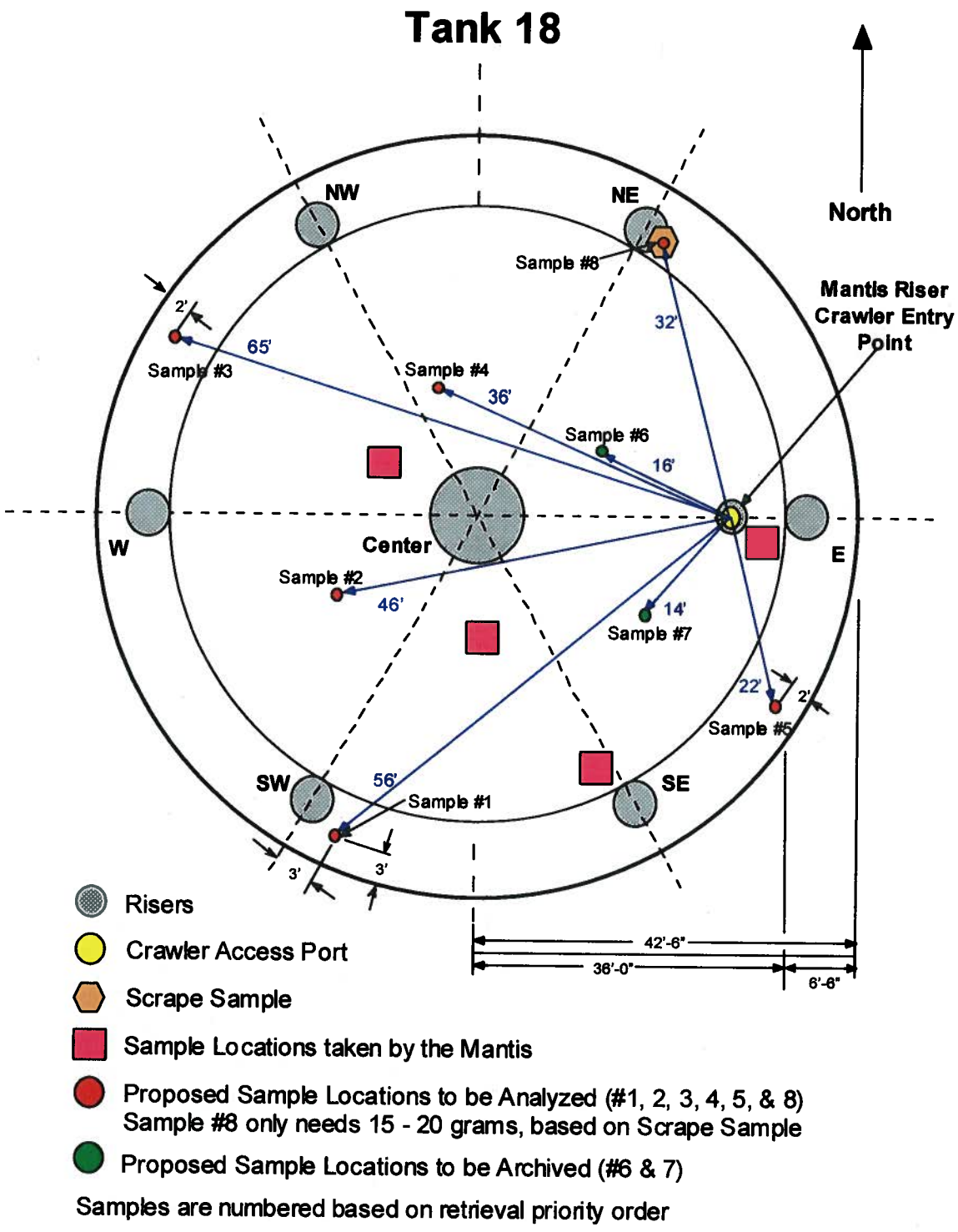
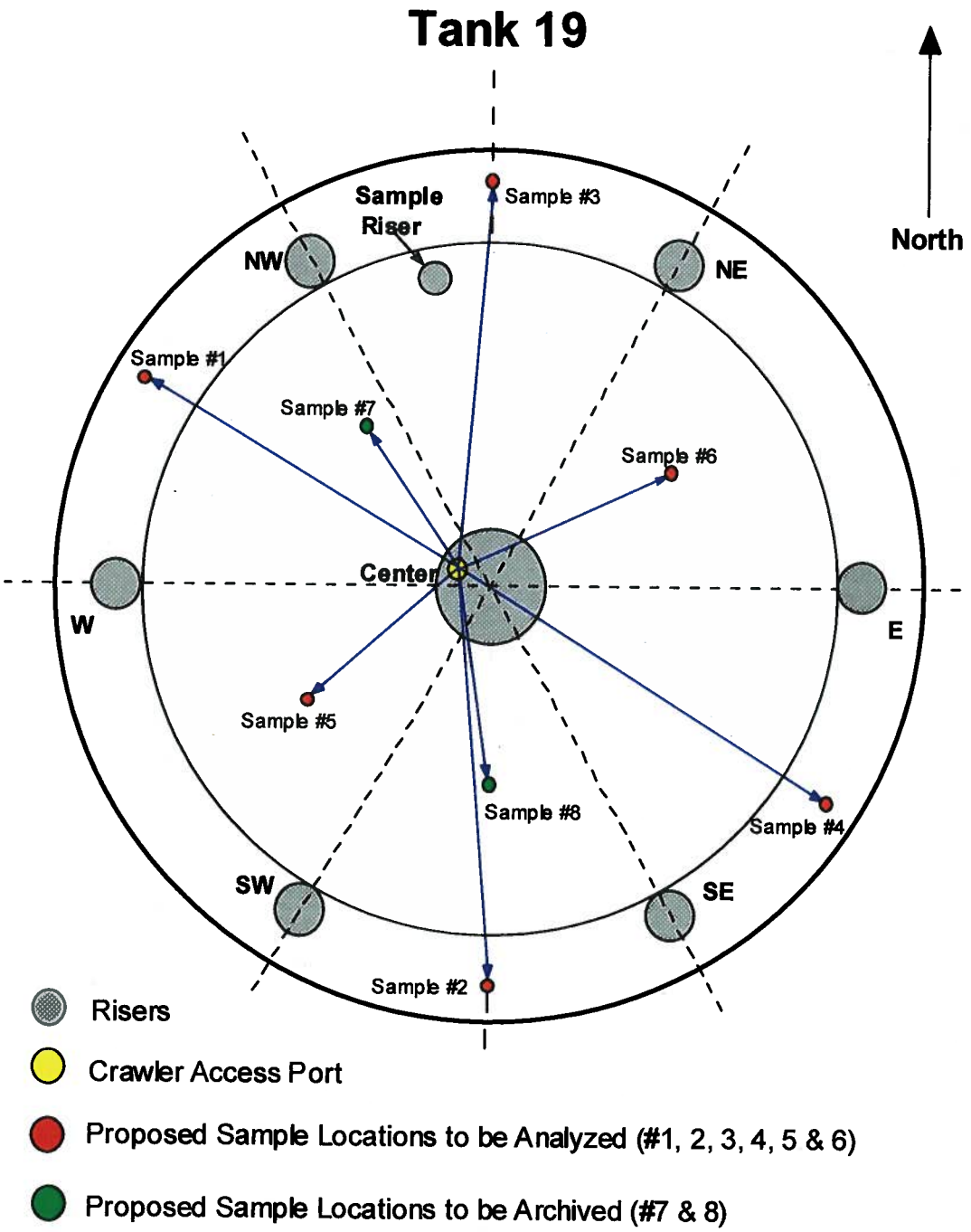


FIGURE 1 – TANK 18 SAMPLE LOCATIONS



Samples are numbered based on retrieval priority order

12/29/09

FIGURE 2 – TANK 19 SAMPLE LOCATIONS

DISCUSSION OF REVISION 1 CHANGES

The weights of the samples collected during the execution of sampling in Tank 19 are shown in Table 5. Several samples were short of the target value of 70 grams. Supplemental samples were obtained in several locations to reach the 70 gram target. However, the amount of residual material remaining (a light dusting of solids) in the sector where sample #6 is located is too small to be able to collect a full 70 gram sample. Therefore, an additional sample was obtained from the North inner sector (adjacent to the sector where sample #6 is located) as a supplement for sample #6. This sample has been designated as sample #9 and is shown in Figure 3.

Table 5: Tank 19F Sample Weights

Sample No.	Sample Weight, g	Supplemental Sample B weight, g	Total Sample Weight, g
1	36.79	59.594	96.384
2	58.646		58.646
3	39.97		39.97
4	59.752		59.752
5	52.496 (5A)	35.271	87.767
6	23.536		23.536
7	30.941	48.699	79.64
8	53.685		53.685
9	56.947		56.947

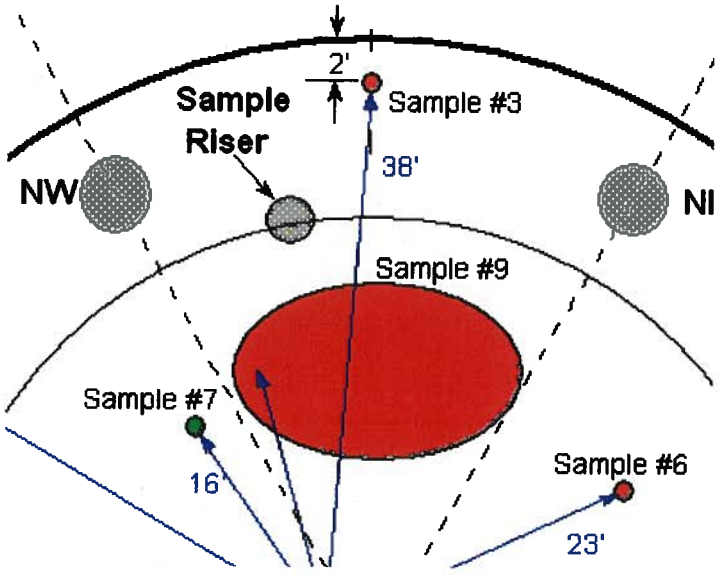


FIGURE 3 – LOCATION OF SAMPLE #9 IN TANK 19

The decision to obtain supplemental samples was based upon the estimated weights of the samples as they were pulled from the tank. The estimates were based upon visual inspections of the samples in the sample containers. The actual weight of the samples collected was less than estimated values* and is attributed to the density of the samples being lower than expected.

Meetings were held with SRNL, the Closure and Waste Disposal Authority group, and Closure Project Engineering to determine a path forward. A strategy for utilization of the sample material collected in Tank 19 was developed. Priority is to be given to completing analyses for constituents listed in Tables 1, 2, and 4 with special emphasis placed on those constituents designated with an asterisk and shown in bold type.

The constituents listed in Table 3 are not expected to be present in the tanks. Therefore, the analysis of the samples for these constituents is considered confirmatory. As a result, having multiple samples to reduce statistical sampling and analytical uncertainty is not as important for these analyses. Thus, analyses for the constituents listed in Table 3 are considered the lowest priority. Sample material will only be used for these analyses after all Table 1, 2, and 4 analyses are completed. Additionally, different samples may be combined as needed to perform these analyses.

The specific decision logic that will be followed for allocation of the available sample material is shown in Attachment 1. Note that samples 5A and 5B will not be gravimetrically composited. This is because the two samples were obtained from different locations within the Southwest sector of the tank and because Sample 5A has enough material to perform the majority of the analyses required.

Based upon the observation of lower density sample material* from Tank 19, two sample containers of material will be obtained at each sample location in Tank 18.

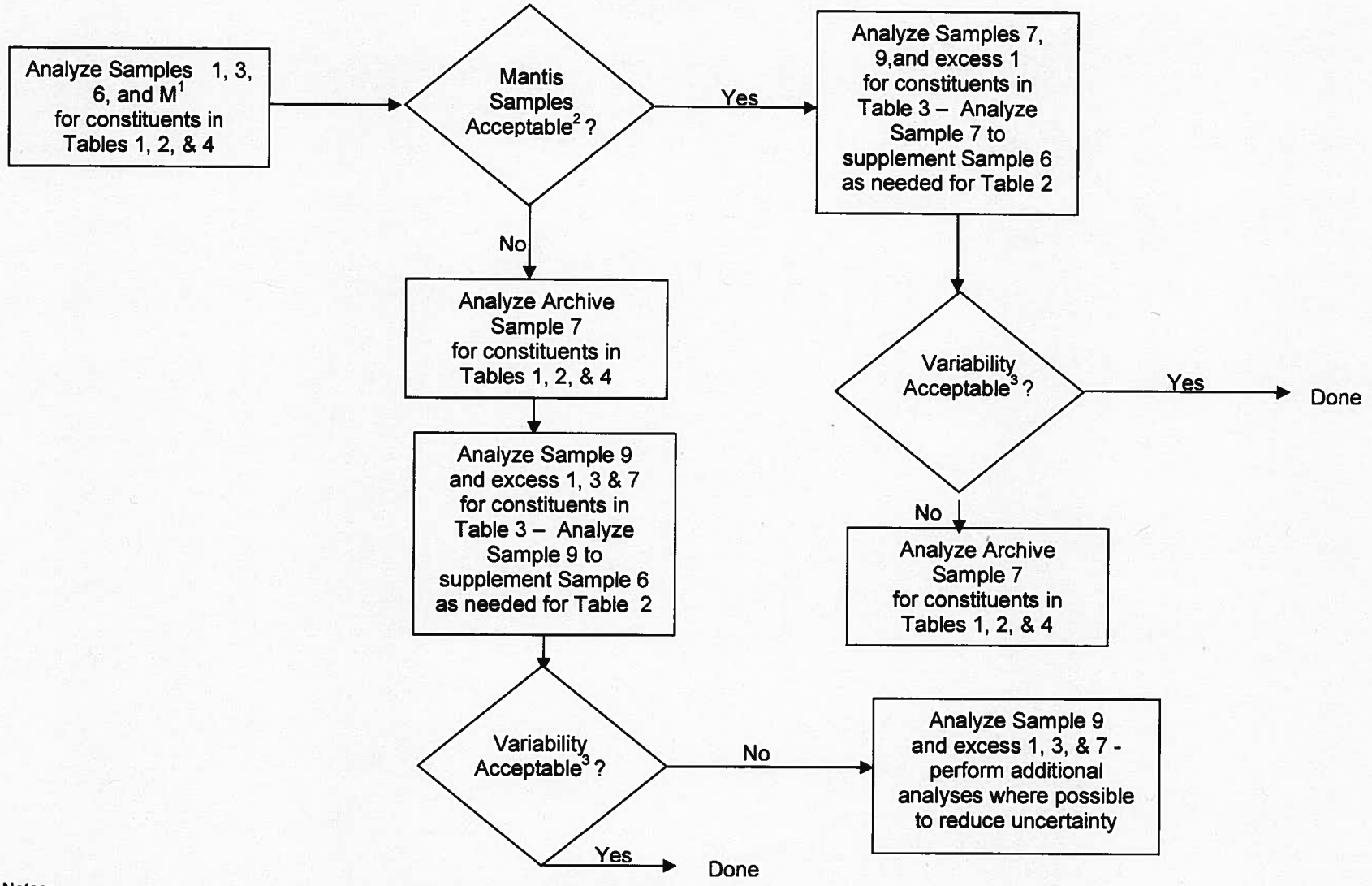
* Estimated weights and corresponding density is based upon measurements of a sample container filled with sand simulant

References:

1) LWO-LWE-2008-00186, "Tanks 18 and 19 Waste Determination Sample Plan," revision 2, dated June 22, 2009.
2) HLE-TTR-2008-066, "Laboratory Analysis for Tanks 18 and 19 Closure Samples," revision 4.
3) SRNL-STI-2009-00782, "Recommendations for Sampling of Tank 18 in F Tank Farm," revision 0, dated December 14, 2009.
4) SRNL-STI-2009-00779, "Recommendations for Sampling of Tank 19 in F Tank Farm," revision 0, dated December 14, 2009.

ATTACHMENT 1 – SAMPLE ANALYSIS DECISION FLOW CHART

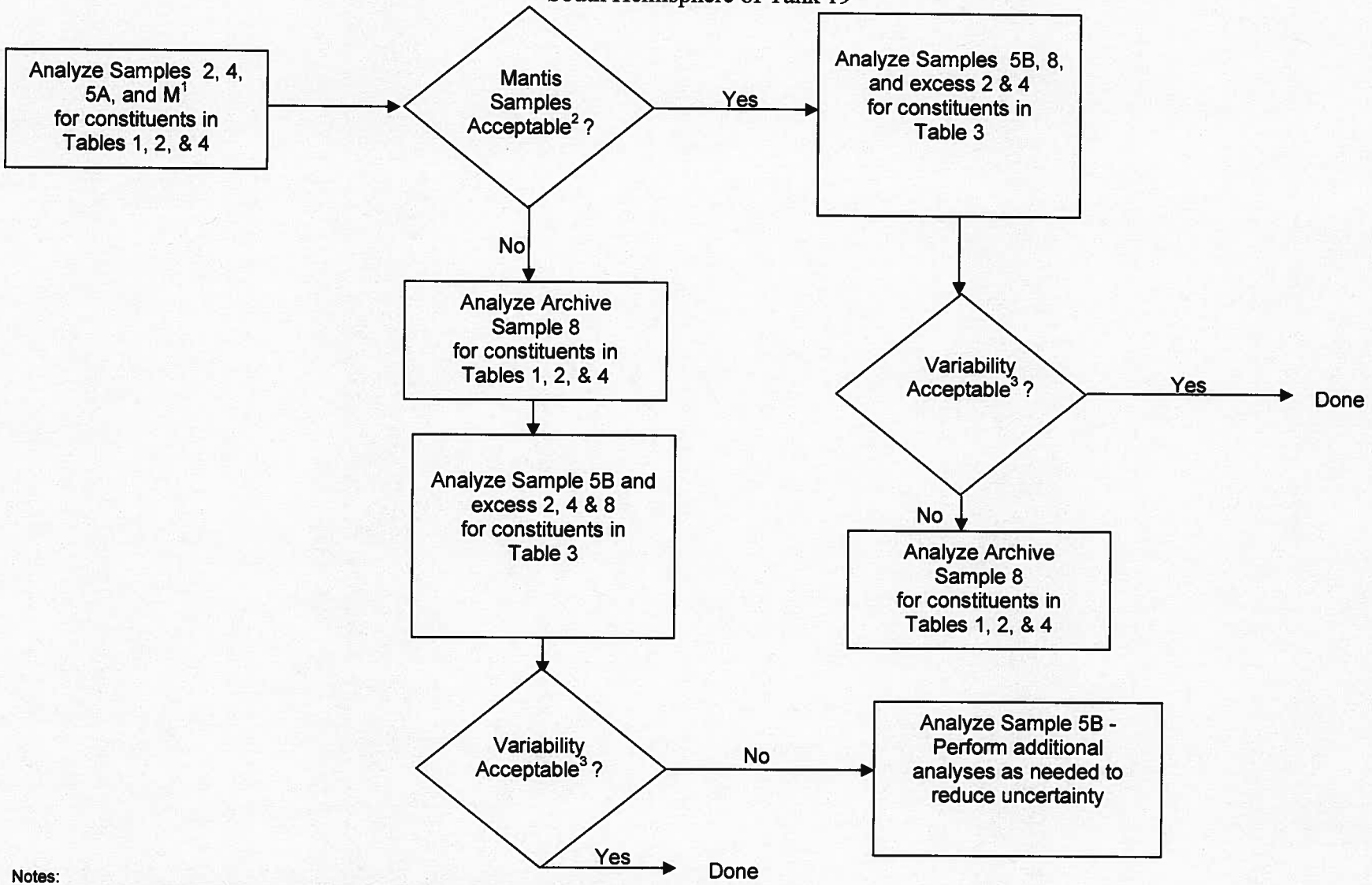
North Hemisphere of Tank 19



Notes:
General - Gravimetric blending will be used to blend samples 1 & 1B and 7 & 7B prior to performing analyses
1) M – In-process samples using the Mantis
2) Mantis Samples Acceptable? – If mantis samples appear to be statistically different from the other floor samples, then the mantis samples are not acceptable and will not be used for waste determination. If the mantis samples appear to be statistically similar to the other floor samples, then the mantis samples are acceptable and will be used for waste determination.
3) Variability Acceptable? – If differences in sample characterization are too high, then the archive sample will need to be analyzed to reduce uncertainty

ATTACHMENT 1 - SAMPLE ANALYSIS DECISION FLOW CHART

South Hemisphere of Tank 19



Notes:
General - Gravimetric blending will be used to blend samples 1 & 1B and 7 & 7B prior to performing analyses
1) M – In-process samples using the Mantis
2) Mantis Samples Acceptable? – If mantis samples appear to be statistically different from the other floor samples, then the mantis samples are not acceptable and will not be used for waste determination. If the mantis samples appear to be statistically similar to the other floor samples, then the mantis samples are acceptable and will be used for waste determination.
3) Variability Acceptable? – If differences in sample characterization are too high, then the archive sample will need to be analyzed to reduce uncertainty

ATTACHMENT 1 - SAMPLE ANALYSIS DECISION FLOW CHART

ADDITIONAL NOTES:

A) The "Mantis Samples Acceptable?" decision point does not require the completion of analysis for all analytes listed in Tables 1, 2, and 4 as described in the predecessor activity blocks. A subset of these analyses will provide enough data to complete the statistical evaluation needed to determine the decision.

B) Similar to Note A, the "Variability Acceptable?" decision point also does not require the completion of all analyses listed in the predecessor activity blocks. Data will be statistically evaluated as it is available. The decision will be made as soon as there is enough data to support a statistical conclusion.

C) The flowchart is not intended to imply that there are timing constraints for starting specific analyses. Analyses may be initiated at the discretion of SRNL for the purpose of schedule efficiency. For example, for Tank 19, due to the limited volume of Sample 6 available, it is expected that Sample 7 will be analyzed for constituents in Table 2 either as a supplement to Sample 6 or because an archive sample is required. Therefore, the analysis of Sample 7 for Table 2 constituents may be started before the "Mantis Samples Acceptable?" decision point is reached.

D) Tank 19 Sample 3 may be supplemented with Sample 7 or Sample 9 as necessary to complete analysis for constituents in Tables 1, 2, and 4. The decision to supplement Sample 3 will be made jointly with input from the SRNL Statistical Group and SRR.